

5.8 Radical Equations and Inequalities

radical equations--equation with a radical containing variables in the radicand

ex: $\sqrt{2x-1} = 3$

$$2x-1 = 9$$

$$2x = 10$$

$$x = 5 \checkmark$$

Steps

1. Isolate the radical
2. "Square" both sides
3. Solve for x
4. Check

ex: $2\sqrt[3]{x} - 1 = 3$

$$2\sqrt[3]{x} = 4$$

$$\sqrt[3]{x} = 2$$

$$x = 8 \checkmark$$

ex: $3x - 5\sqrt{x} = 2$

$$3x - 5\sqrt{x} = 2$$

$$(-5\sqrt{x})^2 = (2-3x)^2$$

$$25x = 4 - 12x + 9x^2$$

$$0 = 9x^2 - 37x + 4$$

$$0 = 9x^2 - 36x - x + 4$$

$$9x(x-4) - 1(x-4)$$

$$0 = (x-4)(9x-1)$$

$$x = 4 \quad x = \frac{1}{9}$$

Extraneous Root

Do:

$$\sqrt{7x-12} = x$$

$$7x-12 = x^2$$

$$0 = x^2 - 7x + 12$$

$$0 = (x-3)(x-4)$$

$$x = 3 \quad x = 4$$

Double $\frac{2}{3} = \frac{2}{3}$

ex:

$$\sqrt{2x+5} = 2\sqrt{2x+1}$$

$$2x+5 = (2\sqrt{2x+1})(2\sqrt{2x+1})$$

$$2x+5 = 8x + 4\sqrt{2x+1} + 1$$

$$-6x+4 = 4\sqrt{2x+1}$$

$$(-3x+2)^2 = (2\sqrt{2x+1})^2$$

$$9x^2 - 12x + 4 = 8x$$

$$9x^2 - 20x + 4 = 0$$

$$9x^2 - 2x - 18x + 4$$

$$x(9x-2) - 2(9x-2)$$

$$(x-2)(9x-2) = 0$$

$$x = 2 \quad x = \frac{2}{9}$$

$$\begin{array}{r} 36 \\ -2 \times -18 \\ -20 \end{array}$$

Do:

$$\sqrt{2x-2} - \sqrt{x+6} = 1$$

Inequalities

ex:

$$\sqrt{3x+6} + 2 \leq 5$$

$$\sqrt{3x+6} \leq 3$$

$$3x+6 \leq 9$$

$$3x \leq 3$$

$$x \leq 1$$

Restrictions

$$3x+6 \geq 0$$

$$3x \geq -6$$

$$x \geq -2$$

Pick any # in each area first

$$-2 \leq x \leq 1$$

ex:

$$6 - \sqrt{2x + 1} < 3$$

HW
p266
15, 17, 23, 27, 30, 33, 35